Abstract Submitted for the GEC20 Meeting of The American Physical Society

Probing the relationship between plasmas self organization and plasma induced fluid circulation in 1 ATM DC glows with liquid anode¹ ZIMU YANG, YAO KOVACH, JANIS LAI, JOHN FOSTER, University of Michigan Ann Arbor — The origin of plasma self organization in DC glows with liquid anode is still not well understood. Above a threshold current, the pattern appears for a given electrolyte. Also observed during self organization is fluid circulation. This circulation is observed both in the plane of the liquid (on surface) and normal to the plasma-liquid interface. The normal circulation gives rise to non-local flow field that enhances overall solution mixing. This work uses particle image velocimetry to map both surface and normal flow fields. More importantly, these measurements allow us to determine if the flows change with self organization. The measurements also yield insight into why the chemical properties of the solution are so stratified. That is, observed solution pH and conductivity changes seem to be local and thus at a certain depth below the surface, there is no change in these parameters. This spatial difference may be enhanced due to this forced convection induced by plasma contact.

¹This work is supported by U.S. Department of Energy with an award DE-SC00-18058.

Zimu Yang University of Michigan

Date submitted: 16 Jun 2020

Electronic form version 1.4